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COMPUTERS IN UNDERGRADUATE TEACHER EDUCATION PROGRAMS

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Clearly, there are many issues that need consideration when one seeks to analyse the role of computers in education. For example, how might computers best support the teaching/learning process given what we know about learning and teaching; what effects will computer technology have on school curriculum; how will presently employed teachers come to grips with this technological change; is all this talk about computer technology and the impact on education relevant anyway — is it more than a fad?

In this paper I want to discuss the curriculum implications of computer technology for the infants and primary school. In particular I will attempt to give answers to each of the following questions.

- what impact are computers having on the school curriculum now;
- how is the curriculum likely to change in the near future; and
- what do these changes mean for undergraduate teacher education programs?

Using Computers to Support the Existing School Curriculum

Computers are presently being used in schools in four main ways

- to teach computer studies
- to teach computer awareness
- in administration
- in computer assisted learning

Neither 'computer studies' nor 'administration' are relevant to the emphasis of this paper. Computer awareness has become a fashion at present, it is a high priority in a number of State Departments of Education, and many teachers are seeking help in planning a K-6

computer literacy course. Parental and employer pressure will ensure that computer awareness remains a high priority over the next few years. At the same time this emphasis on computer awareness hinders the consideration of more significant issues, and deflects discussion away from arguments about the longer term implications of the impact of computer technology on education.

Computer awareness is important now because technological changes have come quickly, schools have been slow to accept them, and there is now a fear that many children who leave school over the next few years will be computer illiterate, and thus unemployable. Certainly some children leaving school have little knowledge of computers, but there is not an agreed-upon set of knowledge and skills that is seen as essential. (I should note here my strong disagreement with any attempt to teach every child computer programming so as to enable them to program a computer.) Further, it appears likely that this lack of computer awareness will be short lived. As computers become more common, as they increasingly find their way into homes and schools, children will become computer literate automatically. A much more significant area for debate is that of computer assisted learning, since this will have significant long term implications for curriculum content, for teaching methodology and for the role of the school.

Computer Assisted Learning in Schools:

Present and Future

The headings used below provide one categorisation system for all those activities taking place in schools that may be referred to as "computer assisted learning".

Drill and practice: Apart from teaching programming in BASIC, the most common use of computers in schools is in drill and practice. For some children in the many schools that now have computers a good part of the drill and practice activities they undertake, particularly in mathematics, spelling and other literacy activities, is done through the computer. This application of computers will grow rapidly, and will involve many subject areas.

Simulation: These activities involve the use of the computer to simulate real life events. Such simulations may be static or dynamic, and may be presented formally or in a game format. The range of software to undertake such activities is small, but has grown rapidly over recent months. By 'static' I mean the program involves the

learner only as an observer: a 'dynamic' simulation requires the learner to form and test hypotheses and so take an active part in decision making.

Problem Solving: Those simulations that are dynamic, where the learner may manipulate variables and so test various possibilities, have a problem solving orientation. Other types of problem solving are possible too — such as game playing, but especially through the use of the programming language LOGO. LOGO has become extremely popular over the last twelve months — largely because it provides an excellent problem solving situation, in the context of allowing very young children to control the computer, and by making use of the graphics capability of microcomputers.

The availability of suitable software (computer programs) for either simulation or problem solving provides a serious limitation to the use of these activities. However, as the number of computers in schools increases so will the availability of software. Future school curricula are likely to be able to make use of such activities; indeed it most likely will come to be seen that these activities not only enrich the school curriculum, but create significant changes to it.

Information Retrieval: At present there is even less software available for this type of activity than for either simulations or problem solving. However, in the not too distant future it is information retrieval which may cause major changes to the school curriculum, and perhaps to the very idea of what is meant by schooling.

Imagine the situation where one is able to dial up data bases containing more information than any university library, using only a small, cheap home computer and a telephone. Add to this the prospect of inexpensive basic skills-oriented computer software where children are able to practise at home many of the things they learn at school. What are the implications for schools here? The question becomes more significant when one realises that the technology just described is already available.

Word Processing: Twelve months ago there were virtually no Australian primary schools using the word processing capability of microcomputers. In the intervening time, word processing has become an accepted part of the curriculum in many schools having computer facilities. Schools will continue to adopt this application

of computers, partly because it is a highly desirable skill *per se*, and partly because it may be used effectively in process writing.

Preservice Teacher Education Curriculum

The changes outlined above have implications for all preservice teacher education programmes. In what follows I have attempted to outline those areas of the existing early childhood and primary programmes that may need to take into account existing computer technology and present day classroom practice.

Broadly speaking, it is likely that almost all early childhood and primary teacher education programmes include studies in each of the following areas as part of their preservice curriculum:

- education studies
- curriculum foundation studies
- curriculum practice subjects

Every contemporary teacher education programme should give consideration to the role of computers, particularly inexpensive microcomputers, in each of these areas of study. In studying the role of the computer in education, students ought to take part in activities where they learn about the capabilities and limitations of computers, where they experience learning from a computer, where they use a computer as a teaching tool, and where they debate the social and educational implications of computer applications.

Education Studies often include subjects concerned with the nature of education, the human learner and the education process. These and other subjects in this sequence of studies cannot afford to ignore the changes that are taking place in computers and computer-related technologies. We are preparing teachers today for a future where technology may be rampant our education studies need to take this situation into account. For example, the nature of education may well undergo significant changes if teaching comes to rely on computer assisted instruction and if learning is more home based. In developing teaching strategies preservice students will be required to know how to effectively use this new technology to enhance the educational experiences of their charges. Equally important, any study of school and society will have to take into account computer oriented pressure groups, together with the often narrow technical and technological emphases of such groups; that is, our students will have to be conversant with the social implications of computers, and particularly be aware that neither

knowledge nor technology is value-free. We have a great responsibility to protect future generations from a narrow, mindless education where schooling might become dehumanised and computer dominated.

Curriculum Foundation Studies are typically those subjects where students revise or extend their knowledge of traditional subject areas, often taking up a major portion of the first year of the student's study programme. There is great opportunity in these subjects to introduce effective use of computers as teaching aids: and this is so whether the subject be art, music, literacy studies, mathematics, or virtually any other subject. Some part of these subjects ought to be organised so as to involve the students in computer based learning activities. Such activities will increase students' computer awareness, and will make them more familiar with the use and potential of computer applications in education.

Curriculum Practice subjects are always under time constraints: new activities demand inclusion, but the existing activities are all valuable, important and necessary. It is in these subjects that teacher educators have a special responsibility. If it is the Education Studies lecturer's role to discuss computer implications in the broader educational context, then it is the Curriculum lecturers who have to help students evaluate the potential of computers in the classroom. Given the range of computer based activities that already exist in infants and primary school, and given the almost certain situation that more and more computers will continue to appear in schools, students need to be helped to be selective in the types of activities for which they use computers in schools.

A mathematics education course that ignores the great range of educational computer software now available or does not even mention LOGO is ignoring present classroom developments, and so doing students a disservice. So, too, are language arts courses that ignore computer software and word processing capabilities. The same could be said for social studies courses where the inquiry approach ought to make use of computer based information retrieval techniques. Similar statements may be able to be made for other curriculum areas too; that is, these subjects must take into account current developments in the classroom, and need to help future teachers evaluate the role of computers in the teaching and learning of specific fields of knowledge.

The availability of a single elective subject on computers in education would allow some students the opportunity to become more expert in the use of computer technology in schools. It must be noted, though, that such a subject is no substitute for the more comprehensive approach outlined above, since it would isolate the computer from many subject areas, and so avoid a broader understanding of the educational implications of computers.

This paper is a revised version of two seminar papers presented to the School of Education, Riverina C.A.E. My reasons for presenting these seminars were the same as my reasons for writing this paper. The issues raised in this paper are important for all teacher education programmes. There is a need for more teacher educators to become actively involved in helping present and future teachers to understand the benefits and dangers associated with technological developments, both in the educational context and in society in general. There is a real possibility that if we do not take up this challenge some learners' educational experiences may become computer dominated: dominated by the wiles of the commercial world, assisted by short sighted bureaucratic expediency and pseudo-efficiency, and permitted to take place by a teaching profession ill-prepared to counter the technological bandwagon.